CHAPTER 5

CONSULTANT AND LOCAL GOVERNMENT PROJECTS

500.00 CONSULTANT AND LOCAL GOVERNMENT PROJECTS

The nature and extent of involvement by the Materials Section will depend upon the exact nature of the project.

For local government projects which are Federally funded, the geotechnical investigation and pavement design may be performed by the Local Government or by a consultant under contract to the Local Government. In either case, the Arizona Department of Transportation (ADOT) becomes involved as the agent for contracting, and in some cases, for contract administration. It is the responsibility of the Materials Section to evaluate the geotechnical investigation and pavement design submitted by the Local Government for compliance with ADOT and FHWA policies and standards.

The Materials Section is also responsible for reviewing the geotechnical and pavement design work performed by Design Consultants hired by ADOT. When ADOT has retained a Management Consultant for administration of design contracts, that firm has the primary responsibility for review and approval of the Design Consultant's submittals. However, the Management Consultant will also forward the submittals to Materials Section for review and comment.

The Local Government or Consulting Engineer is responsible for coordinating all activities related to accomplishing the preliminary survey and pavement design which may involve obtaining permits and/or having an approved traffic control plan. Field sampling work, pavement design, and design information presentation should be done in accordance with the procedures and guidelines listed in the other chapters of this design manual.

500.01 MATERIALS SECTION CONTACTS FOR LOCAL GOVERNMENTS AND CONSULTING ENGINEERS

To assist local governments or consulting engineers with any questions which may arise about ADOT Materials procedures or

methods, the following persons may be contacted within the Materials Section at 255-7231:

Pavement Engineer
Testing Engineer
Geotechnical Engineer

The Pavement Engineer shall be contacted prior to commencement of the preliminary engineering survey or pavement design so that the appropriate Materials Section Design Engineer is identified. Communications between the local government or consulting engineer and Materials personnel should be maintained to ensure that the preliminary engineering survey and design will meet the requirements of the Materials Section. This will eliminate any unnecessary delays during the review process which could affect the scheduled construction date.

On projects which have a Management Consultant, references to notices or submittals to ADOT shall be interpreted to mean notices or submittals to the liaison designated by the Management Consultant. Similarly, ADOT Urban Highways Section will designate a liaison for projects under their jurisdiction.

500.02 TYPES OF PROJECTS

Preliminary engineering soils surveys, laboratory procedures, and pavement designs done by local government or consulting engineers for a wide range of projects will require review by, and close cooperation with, Materials Section. Project types may include, but are not limited to, new pavement construction, widening of existing pavement structures, realignment of existing roadways or streets, rehabilitation of existing pavement surfaces, reconstruction of existing pavement sections, and other miscellaneous pavement improvements.

It should be noted that a wide range of construction alternatives are possible for each type of project, and an effort should be made to consider a number of alternatives so that efficient use of funds may be obtained.

500.03 DESIGN DEVELOPMENT GUIDELINES FOR LOCAL GOVERNMENT AND CONSULTING ENGINEERS

In order to assist local governments and consulting engineers in the development of their project, a guideline outlining required design development procedures follows:

A. COMMENCEMENT OF WORK

Before beginning work on a project, the sponsoring agency or the consultant should contact the Materials Section Geotechnical Services to discuss the geotechnical requirements of the project and to obtain any pertinent information that may be available.

B. INFORMATION AVAILABLE FROM ADOT MATERIALS SECTION

Information which may be useful in the design preparation for a proposed project may be supplied by ADOT Materials Section if it is available for that location.

Traffic information is currently available for any roadway which is part of the state system, including interstates, primary and secondary roads. Traffic counts are encouraged for all local government projects. Assistance may be provided by ADOT Transportation Planning Support Section at 255-7893.

Information on aggregate or borrow pits under permit to ADOT, or in the process of being acquired, may be obtained from Materials Section. Each materials pit has a file which includes a location map of the pit and a summary of laboratory tests conducted on samples from exploration of the pit.

If the project is, or at one time was, part of the State system, as-built information may be available. As-built information should be sought on all rehabilitation projects to obtain knowledge of the existing construction prior to commencing field work.

For rehabilitation projects on the state system, deflection data, ride data, and skid data may also be available, since a regular pavement survey is done by Pavement Management, Materials Section. A maintenance history of the pavement is also available.

C. INFORMATION AVAILABLE FROM THE ADOT ENGINEERING RECORDS

Engineering Records Services at ADOT has many publications available as well as as-built records for most projects constructed on the state system. A publications brochure which is normally distributed when any purchase is made lists all available publications and the prices. Some of the publications which may be useful to the local government or consultant are listed below:

ADOT MATERIALS MANUALS
- Materials Testing Manual
- Preliminary Engineering and Design Manual
- Policy and Procedures Directives Manual

STANDARDS AND SPECIFICATIONS

ADOT Standard Drawings
Part (1) - Construction Details
Part (2) - Structures
Part (3) - Traffic Signals and Lighting
Part (4) - Signing and Marking
ADOT Standard Specifications for Road & Bridge Construction
MAG Specifications
MAG Standard Details
City of Phoenix Supplemental Specifications
City of Phoenix Supplemental Details
ADOT Telephone and Mail Directory

Numerous reports and studies are also available for purchase. These include studies done by ADOT personnel as well as other funded studies, and are listed on the publications brochure distributed by ADOT Engineering Records.

501.01 PRELIMINARY SURVEY WORK

It is the responsibility of the local government or consulting engineer to determine what ownerships are involved with the roadway alignment and any proposed pit locations. The consultant or local government sponsoring agency shall contact each property owner for permission to enter before entering upon the property for exploration purposes. Written license should be obtained before prospecting materials sources. An Environmental Impact Statement and clearance may also be necessary on both centerline and pit sites depending on project location.

All preliminary engineering survey work performed by the local government or an engineering consultant should follow the procedures of this manual. Materials Investigation Procedures are listed in Chapter 1 and Pavement Management and Evaluation Procedures are listed in Chapter 3.

501.02 CENTERLINE INVESTIGATION OF NEW CONSTRUCTION AND RECONSTRUCTION PROJECTS

For new pavement construction, reconstruction, widening of existing roads, or realignment, subgrade exploration and sampling for R-value, PI, Gradation and in-place density should follow procedures listed in Chapter 1 of this manual which are minimal requirements. The Engineer preparing the Geotechnical Report may elect to do additional work in order to more fully

describe and document any unusual or special materials and/or conditions.

To properly record observations and data during the investigation, a working soil profile should be developed and pertinent information recorded and noted on this profile. The base document for the working profile should be the centerline profile provided by the sponsoring agency or, if plans and profiles have already been prepared, the plan profile may be used.

On projects involving new corrugated metal pipe installation, pH and resistivity tests are also required at the proposed pipe location. On projects where existing pipes are to be extended, generally they will be matched in kind and no sampling will be needed unless the project is within a corrosive area, then at least half the pipe locations or a minimum of three locations, whichever is greater, should be sampled and tested. Refer to other sections of the Manual for any additional items that may be required.

501.03 INVESTIGATION FOR REHABILITATION OF EXISTING ROADWAY

For rehabilitation projects, subgrade and base materials do not need to be sampled unless deemed necessary by the responsible Engineer. Asphalt cores should be taken to verify the condition and thickness of the existing surfacing. See Section 103 for coring requirements.

Evaluation of the existing pavement surface should be done at a minimum of 5 locations per project or at least 3 per mile of roadway, whichever is greater. The evaluation should include the following:

1. Cracking - location, percentage, type, width
2. Pavement rutting - locations, depth, width
3. Pavement flushing - location, extent
4. Stripping - location, extent, type
5. Ravelling - location, cause
6. Maintenance patches - location, type, purpose
7. Drainage problems
8. Shoulder condition

A written record should be made of the pavement evaluation by location with photographs or drawings to visually record the types of problems which are evident on the pavement surface.

On projects where overlay of existing pavement is not possible or where cracking of the existing pavement is very extensive, removal of the existing pavement may be necessary.

This is especially true where curb and gutter is present. On projects where recycling of the existing pavement is to be considered, at least 3 six inch cores at selected sampling locations should be taken for recycling tests. In no case should less than 12 locations be sampled, at uniformly spaced locations thru-out the project, in order to provide enough material for a recycle mix design.

In addition, deflection testing should be done if the design traffic is greater than 100,000 18K ESAL's. Deflection test results may be available from ADOT if the roadway is on the state system. If deflection tests are needed, testing can be done by a consultant. If this is not possible Materials Section will conduct the tests upon request.

501.04 INVESTIGATION OF MATERIAL PITS

On projects where borrow will be required, a materials pit will probably be necessary. If the proposed source is one which has not been previously explored by Materials Section, then exploration of the pit would be necessary. Questions regarding pit exploration requirements should be discussed with a Geotechnical Investigation Engineer of the Materials Section. Normally a source is not designated if the required quantity is less than 5,000 cubic yards.

Exploration of materials pits should follow the procedure listed in Chapter 1. The requirements for R-Value tests on borrow sources should be noted.

501.05 EXPLORATION EQUIPMENT AND SAMPLING

Most sampling of subgrade soils for new roadway construction is done with a backhoe. Utilization of a backhoe is encouraged since it will provide a large uncontaminated sample and will allow visual inspection of the different soil horizons, layering and soil structure. Materials pits are also generally explored in this manner for the same reasons.

Samples taken on reconstruction and rehabilitation projects are often taken with coring equipment in order to minimize the disruption of the existing road and because of the shallow depths usually required. These soil samples should include at least the two feet immediately below the existing pavement structure.

Samples should be taken in a manner which will provide an adequate sample size with a minimum of contamination. Care should be exercised in sampling to prevent contamination of

materials. Other methods of sampling are possible provided contamination can be prevented. Sampling techniques other than those listed in the design manual will not be used without prior approval by the Geotechnical Services Engineer. A Field Review of projects contracted to a consulting engineer on the state road system may be conducted from time to time by the Geotechnical Investigation Engineer of Materials Section for informational purposes.

502.00 MATERIALS TESTING

All testing of samples should be performed in compliance with procedures outlined in "Arizona Department of Transportation Materials Testing Manual".

On projects which will utilize cement or lime treatment for base support, ADOT Materials Testing Services Engineer should be contacted for testing requirements.

503.00 TRAFFIC INFORMATION

A good pavement design should be sufficient to provide the required life under the traffic which will be imposed on it. Pavement design traffic information for State Highways is available from Materials Section. For non-state highways and local government projects Appendix A should be reviewed to determine how to calculate pavement design traffic loadings.

504.00 PAVEMENT STRUCTURE DESIGN

The design of all pavement structures should be done according to the design methods listed in Chapters 2 and 4 of this manual. These chapters include the AASHTO Method as modified by ADOT for flexible pavements, ADOT's adoption of AASHTO's method for design of rigid pavements, and an overlay design procedure based upon deflection testing. Minimum pavement designs should be noted as listed in Chapter 2.

505.00 CONSULTANTS OR LOCAL GOVERNMENTS REPORT

The report presented to ADOT should consist of three parts, each of which will stand separately. These are the Geotechnical Report, Pavement Design Summary, and Design Memorandum. Examples of each are available from the Materials Design Engineer or Local Government Services, as well as; shown in Chapter 2. Each of the three reports mentioned shall be signed and sealed by an Arizona registered engineer.

A. GEOTECHNICAL REPORT

The geotechnical report should primarily be a summary of the field exploration, laboratory testing, interpretations and recommendations. It should include the project concept, scope and a site plan. All Geotechnical Reports should contain the following basic information.

1. A summary of the information gathered during field exploration should be presented with visual observations, geology, sample conditions, sample logs, in-place density data, groundwater information, record of existing pavement conditions and existing pavement section measurements should be included when necessary.

2. Laboratory or in situ test data should be presented showing all test results including, but not limited to, R-Value, Plasticity Index, gradation analyses, moisture content, pH, resistivity, proctor density, shear strength, consolidation, sulfate and asphalt tests.

3. A section containing interpretation and analysis of data should be included. This section should contain ground compaction factors, excavation factors, slope ratios and associated testing.

4. Specific recommendations for design.

5. Geotechnical special provisions.

6. A soils profile which clearly illustrates the location, depth and soils physical properties.

7. A section on recommendations, complete with justifications, should be composed as the summary. All references utilized should be listed.

8. An appendix containing engineering calculations shall be submitted.

9. Pit information should include reference to pit numbers, site maps, pit gradation and plasticity indexes, R-values, unit weights, pH and resistivity data, in-place density test data, haul distance and availability.

B. PAVEMENT DESIGN SUMMARY

The pavement design summary is necessary to show the basis for the proposed design. It also provides information necessary for the review of design. The pavement design summary should support the design recommendations made.

The pavement design summary should include a description, location, and reason for the project. Visual observations made by the designer should be listed, especially on rehabilitation projects. Subsoil conditions and geology should be discussed and test results pertinent to the design such as R-values, PI's, gradations, moistures and frost susceptibilities should be listed.

A support argument for the design chosen should be made. For new construction, the selection of the design R-value should be discussed. Other factors important in the design should be listed including traffic numbers and their source, seasonal variation factor, terminal serviceability index, structural coefficients for materials in the pavement section, and required structural number with all factors considered. For rehabilitation projects utilizing deflection design, all results of deflection test should be listed along with the method used. If the project is to be divided into sections with different design recommendations, support should be shown for this division, such as different soil type or different existing pavement conditions.

The pavement design summary should list different design alternatives, an economic cost comparison and a discussion explaining the reason for the alternative chosen. Unit costs and total costs should be listed for each design considered. The Materials Design Engineer can give assistance with regard to recent costs of various pavement materials.

C. DESIGN MEMORANDUM

This is the final part of the report to be supplied by the consulting engineer or local government. Chapter 2 explains the design memo preparation and what should be contained therein. The design memorandum describes what will be constructed and the information it contains is included in the overall project design and plans. It also tells ADOT Contracts and Specifications Services what materials will be used so that the proper specification is included in the contract. It includes other recommendations for construction as well as earthwork factors and sources of any materials.

Much of the memo is made up of standard items which call out a standard or stored specification. Copies of these items are available from ADOT. These items are being constantly updated, and the consultant is encouraged to request the latest version from ADOT Materials Section or Local Government Services.

The incorporation of any specification by reference, other than an ADOT Specification, is not an acceptable procedure. Reference should be made to the appropriate ADOT specification. If another specification is specifically desired for a project which is not on the State highway system, the specification must be written out in full, and will be subject to review and approval by ADOT.

D. PRELIMINARY PAVEMENT STRUCTURE COST ESTIMATE

A pavement cost estimate for each project is developed from the recommended pavement structure following the economic comparison of alternate designs. The cost estimate gives only the costs for the pavement structure and related items. The Preliminary Pavement Structure Cost Estimate is used for comparison purposes to ensure reasonable compliance with the programmed amount for pavements on each project an example format is shown in Figure 203.05-1.

E. REVIEW PROCEDURE

The preparer of the design memorandum should work closely with the Materials Design Engineer associated with the project. Normally, Materials Design Memos are reviewed at least two times prior to being finalized. The local government, their design engineer or ADOT contracted design engineer responsible for the engineering survey and design should submit a preliminary geotechnical report, pavement design summary and design memorandum directly to Materials Section for preliminary review. If close cooperation has been maintained throughout, these reports should be in the proper form at that time. Materials Section personnel will make comments and ask questions concerning these reports and they will be returned to the consultant or local government for revision where necessary.

After revisions have been made as requested, these items will be resubmitted for another review. If revision is complete and acceptable the local government or consulting engineer will be contacted, and ADOT will accept the geotechnical report and pavement design summary and submit the design memo to the necessary locations in ADOT. If revision is not sufficient, these items will be returned to the consultant or local government for more revision. This will continue until these items are acceptable.

F. LOCAL GOVERNMENT AND CONSULTANT SUBMITTALS

The following items are to be submitted:

1. Soil information, including soils classifications, soils profile for new alignments, and log of core samples.

2. Geotechnical Report

3. Design Summary, including an economic comparison of design alternatives.

4. Initial Design memo for review

5. Preliminary pavement structure cost estimate.

6. Final Design Memo

The final version of Geotechnical Report, Design Summary, and Design Memo must be signed and sealed by an Arizona registered engineer.